

CLAIMS

1. A brittle substrate cutting system comprising:

a scribing apparatus including a scribing line forming means for forming a scribing line on a first surface of a brittle substrate; and

a breaking apparatus for breaking the brittle substrate along the scribing line,

wherein the breaking apparatus includes a first pressing controlling means for moving a pressing force upon a second surface of the brittle substrate opposing the first surface of the brittle substrate along the scribing line while the first surface of the brittle substrate is held.

2. A brittle substrate cutting system according to claim 1, wherein the breaking apparatus further comprises:

a pressing means for pressing the second surface of the brittle substrate; and

a first holding means for holding the first surface of the brittle substrate,

wherein the first pressing controlling means controls the pressing means such that the pressing means moves along the scribing line while the first holding means and the pressing means oppose each other with the brittle substrate therebetween.

3. A brittle substrate cutting system according to claim 2, wherein the first pressing controlling means controls the pressing means such that the pressing means rolls along the scribing line.

4. A brittle substrate cutting system according to claim 3, wherein the pressing means is a roller.
5. A brittle substrate cutting system according to claim 3, wherein the pressing means is a conveyor.
6. A brittle substrate cutting system according to claim 3, wherein the pressing means is a bearing.
7. A brittle substrate cutting system according to claim 2, wherein a groove section is formed in the pressing means such that the pressing means does not contact with a line on the second surface of the brittle substrate, the line opposing the scribing line.
8. A brittle substrate cutting system according to claim 2, wherein the breaking apparatus further comprises a first holding controlling means for controlling the first holding means such that the first holding means moves along the scribing line while the first holding means and the pressing means oppose each other with the brittle substrate therebetween.
9. A brittle substrate cutting system according to claim 8, wherein the first holding controlling means controls the first holding means such that the first holding means rolls along the scribing line.
10. A brittle substrate cutting system according to claim 9, wherein the holding means is a roller.
11. A brittle substrate cutting system according to claim 9, wherein the holding means is a conveyor.
12. A brittle substrate cutting system according to claim 9, wherein the holding means is a bearing.

13. A brittle substrate cutting system according to claim 8, wherein a groove section is formed in the first holding means such that the first holding means does not contact with the scribing line.

14. A brittle substrate cutting system according to claim 13, wherein the width of the groove section formed in the first holding means is larger than that of the pressing means.

15. A brittle substrate cutting system according to claim 2, wherein the pressing means further comprises a second holding means and a third holding means for moving along the scribing line in a first direction and for holding the brittle substrate, the second holding means and the third holding means being arranged in the first direction from the pressing means, and

the breaking apparatus further comprises a second holding controlling means for controlling the second holding means such that the second holding means moves on the first surface along the scribing line while the second holding means holds the brittle substrate, and controlling the third holding means such that the third holding means moves on the second surface along the scribing line while the third holding means holds the brittle substrate.

16. A brittle substrate cutting system according to claim 15, wherein the second holding controlling means controls the second holding means such that the first holding means and the second holding means move at a predetermined speed and the second holding controlling means controls the third holding means such that the third holding means and the pressing means move at the predetermined speed while the second holding means and the third holding means oppose each other with the brittle substrate therebetween.

17. A brittle substrate cutting system according to claim 2, wherein the pressing means further comprises a fourth holding means and a fifth holding means for moving along the scribing line in a first direction and for holding the brittle substrate, the fourth holding means and the fifth holding means being arranged in a direction opposite to the first direction from the pressing means.

18. A brittle substrate cutting system according to claim 1, wherein the scribing line forming means comprises a laser beam irradiating means for irradiating a laser beam on the first surface of the brittle substrate and a cooling means for cooling the vicinity of the portions of the first surface of the brittle substrate where the laser beam is irradiated by the laser beam irradiating means.

19. A brittle substrate cutting system according to claim 18, wherein the cooling means is a cooling nozzle, and the cooling nozzle cools the vicinity of the portions where the laser beam is irradiated by spraying a cooling medium on the first surface of the brittle substrate.

20. A brittle substrate cutting system according to claim 19, comprising a laser beam/cooling medium receiving section for receiving at least one of the laser beam irradiated by the laser beam irradiating means and the cooling medium sprayed by the cooling nozzle.

21. A brittle substrate cutting system according to claim 20, wherein the laser beam/cooling medium receiving section is movable separately from the pressing means.

22. A brittle substrate cutting system according to claim 19, wherein the cooling nozzle is movable along the scribing line.

23. A brittle substrate cutting system according to claim 18, wherein the scribing line forming means further comprises a notch forming cutter mechanism for

forming a notch at a starting position of forming the scribing line on the first surface of the brittle substrate.

24. A brittle substrate cutting system according to claim 23, wherein the notch forming cutter mechanism is integrally movable with the laser beam irradiating means and the cooling means.

25. A brittle substrate cutting system according to claim 1, wherein the scribing line forming means is a cutter.

26. A brittle substrate cutting system according to claim 25, wherein the cutter is a disk-shaped cutter wheel tip, and an edge portion is formed in an outer circumferential edge of the cutter wheel tip.

27. A brittle substrate cutting system according to claim 26, wherein a plurality of recessed portions are formed in a ridge-shaped section of the edge portion with a predetermined distance.

28. A brittle substrate cutting system according to claim 25, wherein the cutter is movable separately from the pressing means.

29. A brittle substrate cutting system according to claim 2, wherein the first pressing controlling means controls the pressing means such that the pressing means moves along the scribing line while the first holding means and the pressing means oppose each other with the brittle substrate therebetween and while the scribing line forming means form the scribing line on the first surface of the brittle substrate.

30. A brittle substrate cutting system according to claim 1, wherein the scribing apparatus comprises a scribing line forming means for forming the scribing line on the first surface of the brittle substrate while the first surface of the brittle substrate is held, and

the breaking apparatus further comprises a pressing means for pressing the second surface opposing the first surface of the brittle substrate.

31. A brittle substrate cutting system according to claim 1, wherein the brittle substrate is a bonded substrate obtained by bonding substrates,

the scribing apparatus comprises a first scribing forming means for forming a first scribing line on a first surface of the bonded substrate and a second scribing line forming means for forming a second scribing line on a second surface of the bonded substrate opposing the first surface of the bonded substrate,

the breaking apparatus breaks the bonded substrate along the first scribing line formed on the first surface of the bonded substrate by the first scribing line forming means and breaks the bonded substrate along the second scribing line formed on the second surface of the bonded substrate by the second scribing line forming means, and

the first pressing control means moves a pressing force upon the second surface of the bonded substrate opposing the first surface of the bonded substrate along the scribing line while the first surface of the bonded substrate is held.

32. A brittle substrate cutting system according to claim 1, wherein the breaking apparatus comprises:

a first bonded substrate pressing means for pressing the first surface of the bonded substrate;

a second bonded substrate pressing means for pressing the second surface of the bonded substrate;

a first bonded substrate holding means for holding the first surface of the bonded substrate;

a second bonded substrate holding means for holding the second surface of the bonded substrate;

a first controlling means for the pressing means for controlling the second bonded substrate pressing means such that the second bonded substrate pressing means moves along the first scribing line while the first bonded substrate holding means and the second bonded substrate pressing means oppose each other with the bonded substrate therebetween; and

a second controlling means for the pressing means for controlling the first bonded substrate pressing means such that the first bonded substrate pressing means moves along the second scribing line while the second bonded substrate holding means and the first bonded substrate pressing means oppose each other with the bonded substrate therebetween.

33. A brittle substrate cutting system according to claim 32, wherein the first controlling means for the pressing means controls the second bonded substrate pressing means such that the second bonded substrate pressing means rolls along the first scribing line, and

the second controlling means for the pressing means controls the first bonded substrate pressing means such that the first bonded substrate pressing means rolls along the second scribing line.

34. A brittle substrate cutting system according to claim 33, wherein the first bonded substrate pressing means and the second bonded substrate pressing means are rollers.

35. A brittle substrate cutting system according to claim 33, wherein the pressing means is a conveyor.

36. A brittle substrate cutting system according to claim 33, wherein the pressing means is a bearing.

37. A brittle substrate cutting system according to claim 32, wherein a first groove section is formed in the second bonded substrate pressing means such that the second bonded substrate pressing means does not contact with a line on the second surface of the bonded substrate, the line opposing the first scribing line, and a second groove section is formed in the first bonded substrate pressing means such that the first bonded substrate pressing means does not contact with a line on the first surface of the bonded substrate, the line opposing the second scribing line.

38. A brittle substrate cutting system according to claim 32, wherein the breaking apparatus further comprises a first controlling means for the holding means for controlling the first bonded substrate holding means such that the first bonded substrate holding means moves along the first scribing line while the first bonded substrate holding means and the second bonded substrate pressing means oppose each other with the bonded substrate therebetween, and

a second controlling means for the holding means for controlling the second bonded substrate holding means such that the second bonded substrate holding means moves along the second scribing line while the second bonded substrate holding means and the first bonded substrate pressing means oppose each other with the bonded substrate therebetween.

39. A brittle substrate cutting system according to claim 38, wherein the first controlling means for the holding means controls the first bonded substrate holding means such that the first bonded substrate holding means rolls along the first scribing line, and

the second controlling means for the holding means controls the second bonded substrate holding means such that the second bonded substrate holding means rolls along the second scribing line.

40. A brittle substrate cutting system according to claim 39, wherein the first bonded substrate holding means and the second bonded substrate holding means are rollers.

41. A brittle substrate cutting system according to claim 39, wherein the first bonded substrate holding means and the second bonded substrate holding means are conveyors.

42. A brittle substrate cutting system according to claim 39, wherein the first bonded substrate holding means and the second bonded substrate holding means are bearings.

43. A brittle substrate cutting system according to claim 38, wherein a third groove section is formed in the first bonded substrate holding means such that the first bonded substrate holding means does not contact with the first scribing line, and

a fourth groove section is formed in the second bonded substrate holding means such that the second bonded substrate holding means does not contact with the second scribing line.

44. A brittle substrate cutting method according to claim 43, wherein the width of the third groove section formed in the first bonded substrate holding means is larger than that of the second bonded substrate pressing means, and the width of the fourth groove section formed in the second bonded substrate holding means is larger than that of the first bonded substrate pressing means.

45. A brittle substrate cutting method according to claim 32, wherein the first bonded substrate pressing means and the second substrate pressing means move in a first direction along the first scribing line and the second scribing line, and the brittle substrate cutting system further comprises a third bonded substrate holding means and a fourth bonded substrate holding means respectively for holding the brittle substrate in the first direction from the first bonded substrate pressing means and the second bonded substrate pressing means, and

the breaking apparatus further comprises a third controlling means for the holding means for controlling the third bonded substrate holding means such that the third bonded substrate holding means moves on the first surface along the first scribing line while the third bonded substrate holding means holds the bonded substrate, and controlling the fourth bonded substrate holding means such that the fourth bonded substrate holding means moves on the second surface along the second scribing line while the fourth bonded substrate holding means holds the bonded substrate.

46. A brittle substrate cutting system according to claim 45, wherein the third controlling means for the holding means controls the third bonded substrate holding means such that the third bonded substrate holding means, the first bonded substrate holding means and the first bonded substrate pressing means move at a predetermined speed and the third controlling means for the holding means controls the fourth bonded substrate holding means such that the fourth bonded substrate holding means, the second bonded substrate holding means and the second bonded substrate pressing means move at the predetermined speed while the third bonded substrate holding means and the fourth bonded substrate holding means oppose each other with the bonded substrate therebetween.

47. A brittle substrate cutting system according to claim 32, wherein the first bonded substrate pressing means moves in the first direction along the second scribing line,

the second bonded substrate pressing means moves in the first direction along the first scribing line, and

the brittle substrate cutting system further comprises a fifth bonded substrate holding means and a sixth bonded substrate holding means respectively for holding the brittle substrate in a direction opposite to the first direction from the first bonded substrate pressing means and the second bonded substrate pressing means.

48. A brittle substrate cutting system according to claim 32, wherein the first controlling means for the pressing means controls the second bonded substrate pressing means such that the second bonded substrate pressing means moves along the first scribing line and the second controlling means for the pressing means controls the first bonded substrate pressing means such that the first bonded substrate pressing means moves along the second scribing line while the first bonded substrate holding means and the second bonded substrate pressing means oppose each other with the bonded substrate therebetween, the first scribing line forming means forms the first scribing line on the first surface of the bonded substrate, the second bonded substrate holding means and the first bonded substrate pressing means oppose each other with the bonded substrate therebetween and the second scribing line forming means forms the second scribing line on the second surface of the bonded substrate.

49. A brittle substrate cutting method, comprising the steps of:

(a) forming a scribing line on a first surface of a brittle substrate; and

(b) breaking the brittle substrate along the scribing line, and
the step (b) includes the step of:

(b-1) moving a pressing force upon a second surface of the brittle substrate opposing the first surface of the brittle substrate along the scribing line while the first surface of the brittle substrate is held.

50. A brittle substrate cutting method according to claim 49, wherein the step (b) is performed by a breaking apparatus for breaking the brittle substrate along the scribing line, the breaking apparatus includes:

a pressing means for pressing the second surface of the brittle substrate; and

a first holding means for holding the first surface of the brittle substrate, and

the step (b-1) includes the step of moving the pressing means along the scribing line while the first holding means and the pressing means oppose each other with the brittle substrate therebetween.

51. A brittle substrate cutting method according to claim 50, wherein the step (b-1) includes the step of controlling the pressing means such that the pressing means rolls along the scribing line.

52. A brittle substrate cutting method according to claim 51 wherein the pressing means is a roller.

53. A brittle substrate cutting method according to claim 51 wherein the pressing means is a conveyor.

54. A brittle substrate cutting method according to claim 51 wherein the pressing means is a bearing.

55. A brittle substrate cutting method according to claim 50, wherein a groove section is formed in the pressing means such that the pressing means does not contact with a line on the second surface of the brittle substrate, the line opposing the scribing line.

56. A brittle substrate cutting method according to claim 50, wherein the step (b) further includes the step of:

(b-2) controlling the first holding means such that the first holding means moves along the scribing line while the first holding means and the pressing means oppose each other with the brittle substrate therebetween.

57. A brittle substrate cutting method according to claim 56, wherein the step (b-2) includes the step of controlling the first holding means such that the first holding means rolls along the scribing line.

58. A brittle substrate cutting method according to claim 57, wherein the holding means is a roller.

59. A brittle substrate cutting method according to claim 57, wherein the holding means is a conveyor.

60. A brittle substrate cutting method according to claim 57, wherein the holding means is a bearing.

61. A brittle substrate cutting method according to claim 56, wherein a groove section is formed in the first holding means such that the first holding means does not contact with the scribing line.

62. A brittle substrate cutting method according to claim 61, wherein the width of the groove section formed on the first holding means is larger than that of the pressing means.

63. A brittle substrate cutting method according to claim 50, wherein the pressing means moves along the scribing line in a first direction and further comprises a second holding means and a third holding means for holding the brittle substrate in the first direction from the pressing means,

the step (b) further includes the step of:

(b-3) controlling the second holding means such that the second holding means moves on the first surface along the scribing line while the second holding means holds the brittle substrate, and controlling the third holding means such that the third holding means moves on the second surface along the scribing line while the third holding means holds the brittle substrate.

64. A brittle substrate cutting method according to claim 63, wherein the step (b-3) includes the step of controlling the second holding means such that the first holding means and the second holding means move at a predetermined speed, and controlling the third holding means such that the third holding means and the pressing means move at the predetermined speed while the second holding means and the third holding means oppose each other with the brittle substrate therebetween.

65. A brittle substrate cutting method according to claim 2, wherein the pressing means moves in a first direction along the scribing line and further comprises a fourth holding means and a fifth holding means for holding the brittle substrate in a direction opposite to the first direction from the pressing means.

66. A brittle substrate cutting method according to claim 49, wherein the step (a) includes the steps of:

(a-1) irradiating a laser beam on the first surface of the brittle substrate; and

(a-2) cooling the vicinity of the portions of the first surface of the brittle substrate where the laser beam is irradiated by the laser beam irradiating means.

67. A brittle substrate cutting method according to claim 66, wherein the step (a-2) is performed by a cooling medium the cooling means is a cooling nozzle, and the cooling nozzle cools the vicinity of the portions where the laser beam is irradiated, by spraying a cooling medium on the first surface of the brittle substrate.

68. A brittle substrate cutting method according to claim 67, wherein the step (a-1) is performed by a laser beam irradiating means and includes the step of receiving at least one of the laser beam irradiated by the laser beam irradiating means and the medium sprayed by the cooling nozzle.

69. A brittle substrate cutting method according to claim 68, wherein the step of receiving at least one of the laser beam irradiated by the laser beam irradiating means and the medium sprayed by the cooling nozzle is performed by a laser beam/cooling medium receiving section, and the laser beam/cooling medium receiving section is movable separately from the pressing means.

70. A brittle substrate cutting method according to claim 68, wherein the cooling nozzle is movable along the scribing line.

71. A brittle substrate cutting method according to claim 66, wherein the step (a) further includes the step of forming a notch at a starting position of forming the scribing line on the first surface of the brittle substrate.

72. A brittle substrate cutting method according to claim 71, wherein the step of forming a notch is performed by a notch forming cutter mechanism, and the notch forming cutter mechanism is integrally movable with the laser beam irradiating means and the cooling means.

73. A brittle substrate cutting method according to claim 49, wherein the step (a) is performed by a scribing line forming means, and

the scribing line forming means is a cutter.

74. A brittle substrate cutting method according to claim 73, wherein the cutter is a disk-shaped cutter wheel tip, and an edge portion is formed in an outer circumferential edge of the cutter wheel tip.

75. A brittle substrate cutting method according to claim 74, wherein a plurality of recessed portions are formed in a ridge-shaped section of the edge portion with a predetermined distance.

76. A brittle substrate cutting method according to claim 73, wherein the cutter is movable separately from the pressing means.

77. A brittle substrate cutting method according to claim 50, wherein the step (b-1) controls the pressing means such that the pressing means moves along the scribing line while the first holding means and the pressing means oppose each other with the brittle substrate therebetween and while the scribing line forming means forms the scribing line on the first surface of the brittle substrate.

78. A brittle substrate cutting method according to claim 49, wherein the step (a) further includes the step of forming the scribing line on the first surface of the brittle substrate while the first surface of the brittle substrate is held, and

the step (b) further includes the step of pressing a second surface opposing the first surface of the brittle substrate.

79. A brittle substrate cutting method according to claim 49, wherein the brittle substrate is a bonded substrate obtained by bonding substrates,

the scribing apparatus comprises a first scribing forming means for forming a first scribing line on a first surface of the bonded substrate and a second

scribing line forming means for forming a second scribing line on a second surface of the bonded substrate opposing the first surface of the bonded substrate,

the step (b-1) includes the steps of:

breaking the bonded substrate along the first scribing line formed on the first surface of the bonded substrate by the first scribing line forming means and breaking the bonded substrate along the second scribing line formed on the second surface of the bonded substrate by the second scribing line forming means, and

moving a pressing force upon the second surface of the bonded substrate opposing the first surface of the bonded substrate along the scribing line while the first surface of the bonded substrate is held.

80. A brittle substrate cutting method according to claim 49, wherein the step (b) is performed by a breaking apparatus for breaking the brittle substrate along the scribing line, the breaking apparatus includes:

a first bonded substrate pressing means for pressing the first surface of the bonded substrate;

a second bonded substrate pressing means for pressing the second surface of the bonded substrate;

a first bonded substrate holding means for holding the first surface of the bonded substrate; and

a second bonded substrate holding means for holding the second surface of the bonded substrate,

the step (b-1) includes the steps of:

controlling the second bonded substrate pressing means such that the second bonded substrate pressing means moves along the first scribing line while

the first bonded substrate holding means and the second bonded substrate holding means oppose each other with the bonded substrate therebetween; and

controlling the first bonded substrate pressing means such that the first bonded substrate pressing means moves along the second scribing line while the second bonded substrate holding means and the first bonded substrate holding means oppose each other with the bonded substrate therebetween.

81. A brittle substrate cutting method according to claim 80, wherein the step (b-1) includes the steps of:

controlling the second bonded substrate pressing means such that the second bonded substrate pressing means rolls along the first scribing line; and

controlling the first bonded substrate pressing means such that the first bonded substrate pressing means rolls along the second scribing line.

82. A brittle substrate cutting method according to claim 81, wherein the first bonded substrate pressing means and the second bonded substrate pressing means are rollers.

83. A brittle substrate cutting method according to claim 81, wherein the pressing means is a conveyor.

84. A brittle substrate cutting method according to claim 81, wherein the pressing means is a bearing.

85. A brittle substrate cutting method according to claim 80, wherein a first groove section is formed in the second bonded substrate pressing means such that the second bonded substrate pressing means does not contact with a line on the second surface of the bonded substrate, the line opposing the first scribing line, and a second groove section is formed in the first bonded substrate pressing means such that the first bonded substrate pressing means does not

contact with a line on the first surface of the bonded substrate, the line opposing the second scribing line.

86. A brittle substrate cutting method according to claim 80, wherein the step (b) further includes the steps of:

(b-2) controlling the first bonded substrate holding means such that the first bonded substrate holding means moves along the first scribing line while the first bonded substrate holding means and the second bonded substrate pressing means oppose each other with the bonded substrate therebetween, and controlling the second bonded substrate holding means such that the second bonded substrate holding means moves along the second scribing line while the second bonded substrate holding means and the first bonded substrate pressing means oppose each other with the bonded substrate therebetween.

87. A brittle substrate cutting method according to claim 86, wherein the step (b-2) includes the step of controlling the first bonded substrate holding means such that the first bonded substrate holding means rolls along the first scribing line, and controlling the second bonded substrate holding means such that the second bonded substrate holding means rolls along the second scribing line.

88. A brittle substrate cutting method according to claim 87, wherein the first bonded substrate holding means and the second bonded substrate holding means are rollers.

89. A brittle substrate cutting method according to claim 87, wherein the first bonded substrate holding means and the second bonded substrate holding means are conveyors.

90. A brittle substrate cutting method according to claim 87, wherein the first bonded substrate holding means and the second bonded substrate holding means are bearings.

91. A brittle substrate cutting method according to claim 86, wherein a third groove section is formed in the first bonded substrate holding means such that the first bonded substrate holding means does not contact with the first scribing line, and

a fourth groove section is formed in the second bonded substrate holding means such that the second bonded substrate holding means does not contact with the second scribing line.

92. A brittle substrate cutting method according to claim 91, wherein the width of the third groove section formed in the first bonded substrate holding means is larger than that of the second bonded substrate pressing means, and the width of the fourth groove section formed in the second bonded substrate holding means is larger than that of the first bonded substrate pressing means.

93. A brittle substrate cutting method according to claim 84, wherein the first bonded substrate pressing means and the second substrate pressing means respectively move in a first direction along the first scribing line and the second scribing line, and the brittle substrate cutting method further comprises the use of a third bonded substrate holding means and a fourth bonded substrate holding means respectively for holding the brittle substrate in the first direction from the first bonded substrate pressing means and the second bonded substrate pressing means,

the step (b) further includes the step of:

(b-3) controlling the third bonded substrate holding means such that the third bonded substrate holding means moves on the first surface along the first

scribing line while the third bonded substrate holding means holds the bonded substrate, and controlling the fourth bonded substrate holding means such that the fourth bonded substrate holding means moves on the second surface along the second scribing line while the fourth bonded substrate holding means holds the bonded substrate.

94. A brittle substrate cutting method according to claim 93, wherein the step (b--3) includes the step of:

controlling the third bonded substrate holding means such that the third bonded substrate holding means, the first bonded substrate holding means and the first bonded substrate pressing means move at a predetermined speed and the third controlling means for the holding means controls the fourth bonded substrate holding means such that the fourth bonded substrate holding means, the second bonded substrate holding means and the second bonded substrate pressing means move at the predetermined speed while the third bonded substrate holding means and the fourth bonded substrate holding means oppose each other with the bonded substrate therebetween.

95. A brittle substrate cutting method according to claim 80, wherein the first bonded substrate pressing means moves in the first direction along the second scribing line,

the second bonded substrate pressing means moves in the first direction along the first scribing line,

the brittle substrate cutting method further comprises the use of a fifth bonded substrate holding means and a sixth bonded substrate holding means respectively for holding the brittle substrate in a direction opposite to the first

direction from the first bonded substrate pressing means and the second bonded substrate pressing means.

96. A brittle substrate cutting method according to claim 80, comprising the step of controlling the second bonded substrate pressing means such that the second bonded substrate pressing means moves along the first scribing line and controlling the first bonded substrate pressing means such that the first bonded substrate pressing means moves along the scribing line while the first bonded substrate holding means and the second bonded substrate pressing means oppose each other with the bonded substrate therebetween, the first scribing line forming means forms the first scribing line on the first surface of the bonded substrate, the second bonded substrate holding means and the first bonded substrate pressing means oppose each other with the bonded substrate therebetween and the second scribing line forming means forms the second scribing line on the second surface of the bonded substrate.